Space Weather Forecast

Issued on Wednesday, 27 September 2023 at 01:16 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of Moderate flares (R1-R2 Radio blackouts) throughout. Slight chance of G1 minor geomagnetic storms early Day 1 (27 Sep).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity was Low, with the largest flare a mid-level Common-class flare observed at 26/0428UTC from the main sunspot region in the south-centre disc.

There are currently eight sunspot regions on the visible disc, with six of these located in the western hemisphere. The region located in the south-centre disc is a mixed polarity region and remains the largest and most active. Only small changes in evolution have been observed in recent imagery. Two moderately large bipolar regions are in the northwest quadrant, again with slow overall changes in evolution. One of these is now beginning to rotate around the northwest horizon. Another moderate size region is now nearing south-centre disc, and has continued to show some growth and consolidation. Other regions are generally simple and unremarkable.

A filament lift-off around 25/1540 UTC produced a coronal mass ejection (CME) to the northwest, and has been analysed as a miss. No other potential Earth-directed CMEs have been observed in the past 24hrs.

Solar Wind / Geomagnetic Activity: Solar winds have been mostly at slightly elevated levels due to the lingering effects of a CME which arrived at Earth on the UTC evening of 24 Sep. Winds have increased to elevated levels since around 26/1300 UTC, and have remained steady since then. The Interplanetary magnetic field (IMF) started off at strong levels, before a steady decline through the day has seen it become weak. The north-south component was predominantly negative (southward), but has been variable at times. Resultant geomagnetic activity was mostly in the range Quiet to Active (Kp 2 to 4), but with G1/Minor Storm (Kp 5) intervals observed between 26/0600-0900 UTC and 26/1200-1500 UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained at background levels, with no Solar Radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is forecast to be generally Low, but with a chance of Moderate flares, and a slight chance of isolated Strong flares, most likely from the main sunspot region in the south.

Solar Wind / Geomagnetic Activity: The effects of the recent CME arrival are expected to be minimal, although a possible glance from other weak CME arrivals cant be ruled out early on Day 1 (27 Sep), however this is deemed very low confidence. Solar winds are expected to remain at elevated levels at first, most likely as a result of a coronal hole, but should start to drop back to more background levels as any coronal hole influence eases.

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Geomagnetic activity will be mostly Quiet to Active (Kp2-4) at first, perhaps with a chance of G1/Minor Storm intervals (Kp5) from any weak CME arrival early Day 1. Activity then likely to ease to Quiet to Unsettled (Kp1-3) levels through the latter half of Day 1 and into Day 2 (28 Sep), with these conditions expected to continue through the rest of the period. There is a possible glancing CME that may give a further enhancement late on Day 2, but this is very low confidence.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to remain generally at background levels, but with a slight chance of Solar Radiation storms.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	20	20	10	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	40	40	40	40
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	15	15	15	15
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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